

CLAIMS

I CLAIM:

1. A lift measurement system for determining a position of a load during a lift operation of the type including a stationary cylinder and an associated piston that is extendable and retractable with respect to the cylinder at a load support zone of the load to correspondingly raise and lower the load, the system comprising:
 - 5 a display including a scale and enclosing an indicator that is movable with respect to the scale; and
 - a linkage operatively coupled at one end to the load support zone, and connected at a second end to the display, wherein the linkage transfers movement of the load at the load support zone to the indicator to move the indicator relative to the scale.
2. The lift measurement system as recited in claim 1, wherein the linkage comprises a cable assembly having a proximal end attached to the load and a distal end attached to the indicator.
3. The lift measurement system as recited in claim 2, wherein the cable assembly further comprises a cable member connected between the load and the indicator.
4. The lift measurement system as recited in claim 3, wherein the cable member is surrounded by a stationary sleeve.
5. The lift measurement system as recited in claim 4, wherein the sleeve is connected at one end to the cylinder, and at a second end to the display.
6. The lift measurement system as recited in claim 5, wherein the sleeve is connected to the cylinder via a bracket attached to the cylinder.
7. The lift measurement system as recited in claim 3, wherein the linkage further comprises a conduit containing hydraulic fluid.
8. The lift measurement system as recited in claim 1, wherein the linkage is attached to an upper end of the indicator
9. The lift measurement system as recited in claim 1, wherein the linkage is attached to a lower end of the indicator

10. The lift measurement system as recited in claim 1, wherein the display further comprises a cylinder having a closed end connected to one end of the spring, and wherein the spring is connected at a second end to the indicator.

11. The lift measurement system as recited in claim 1, wherein the linkage is fastened to the load at the load support zone

12. The lift measurement system as recited in claim 1, wherein the linkage further comprises a plate that engages the load at the load support zone under forces from a spring extending between the sleeve and the plate.

13. The lift measurement system as recited in claim 1, further comprising a plurality of linkages coupled to a corresponding plurality of load support zones, wherein each linkage is coupled to a corresponding scale.

14. The lift measurement system as recited in claim 13, wherein the plurality of displays provide an indication of a load orientation.

15. A support system for performing lift operations on a load and determining a load orientation, the load support system comprising:

first and second lifting systems that support the load at a corresponding first and second load support zone, each lifting system including a cylinder and corresponding
5 piston that is extendable and retractable relative to the respective cylinder;

first and second displays linked to the corresponding first and second lifting systems, wherein each display includes a scale and encloses an indicator that is movable with respect to the scale; and

10 first and second linkages connected between the first and second zone, respectively, and the first and second scale, respectively, wherein each linkage transfers movement of the corresponding load support by movement of a medium through a conduit to move the corresponding indicator relative to the scale,

wherein each indicator can be read relative to the corresponding scale to determine the load orientation.

16. The support system as recited in claim 15, wherein each scale provides an output of an actual load position.

17. The support system as recited in claim 15, wherein each linkage comprises a cable assembly having a proximal end coupled to the corresponding load support zone, and a distal end connected to the corresponding indicator.
18. The support system as recited in claim 15, wherein each linkage comprises a conduit containing hydraulic fluid.
19. The support system as recited in claim 15, wherein each display further comprises a cylinder having a closed end connected to one end of the spring, and wherein the spring is connected at a second end to the indicator.
20. The support system as recited in claim 15, wherein each linkage further comprises a plate that engages the load at the corresponding load support zone under forces from a spring.